DOCUMENT RESUME

ED 046 896 SP 004 644

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TITLE Curriculum: Hierarchy or Decalage?
PUB DATE 71
NOTE 5p.; Paper presented at annual meeting, AERA, New York, 1971

EDRS PRICE EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS *Curriculum, *Curriculum Design, Curriculum Research

ABSTRACT

The assumptions of curriculum based upon external reinforcement psychology and subject-content mastery by remands and punishments are 1) a stable pupil IQ, 2) largely environmentally determined, 3) essentially evaluated through problem-solving to get answers, 4) a one-to-one correspondence with concept and conceptual-scheme hierarchical learning and 5) culture-free within the dominant culture. Equilibrationists, on the contrary, base curriculum on these assumptions: 1) a dynamic, ever-changing intellect, 2) determined through (genetic) maturation amd (environment) interaction in which, as processes are conserved, they form a readiness for the next stages in an invariant decalage, 3) through logic (to evaluate answers as well as to find them), 4) which schema have a one-to-one correspondence established between perceptual and conceptual worlds and 5) are culture-determined unless education intervenes to reduce cultural blindness with an educational component. The former is teacher-oriented, the latter learner-oriented. Equilibration curriculum research in the USA falls far behind external-reinforcement content-mastery research and needs much attention. (Included in the comparison is description of curriculum material construction, evaluation, outcomes, and materials of instruction for each of the two curriculum types.) (Author/JS)

ED046896

Curriculum: Hierarchy or Decalage?

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Concept-learning, in a hierarchy of conceptual schemes, has been the heart of external reinforcement curricula in this country for many years. As the physicist differentiates between calorie and Calorie (kilocalorie), so the curriculumist may differentiate between curriculum in the narrow sense of inanimate materials and Curriculum in the broader sense of materials-teacher-learner of the educational environment (including the school). The subject of this paper is the recent challenge to traditional curriculum construction on a concept-learning base, as opposed to the curriculum hypothesized by the Geneva school, based on the decalage and equilibration theory.

Decalage, in case you've wondered, is the invariant sequence by which children learn processes, based upon (i) maturation and (ii) kind and quantity of interaction with some environment. In contradistinction to the hierarchy of principles inherent in the logic of the subject, the decalage is the sequence of processes inherent in the child's development. By "equilibration", the Geneva school postulates that, in learning, cognitive conflict occurs when a new bit of information drawn from the environment-contact, does not fit the previously-encountered seriation of classes and/or the included cases in each class; e.g., an ostrich suddenly encountered is hard to class under "bird" to a child only acquainted with wrens and robins. In such encounters, the child learns by equilibrating the new with the old,

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somewhat in the fashion of balancing a chemical equation. The resultant is a new way of looking at Bruner's process of education. The content-hierarchy is curriculum-centered, whereas equilibration is Curriculum-centered. In this, the newer viewpoint requires that we re-equilibrate our ideas of curriculum, from content-only to interactional procedures. Further, since it can be seen that the hierarchy fits well a teacher-dominated class, by the same terms the decalage is pupil-developed, with the new teacher role being that of chief-learner, in a group of learners.

By the nature of this discussion, the central focus of my remarks will be upon the curricular aspects of the hierarchy and the decalage, rather than the teaching-learning side. We need to look at the essential differences between them in (i) construction, (ii) evaluation and re-evaluation, (iii) outcomes, and (iv) materials of instruction. We will take as typical of the hierarchy the work of Gagne, and as typical of equilibration the growth of logical thinking as outlined in childhood and youth in the writings of Piaget and Inhelder. As to learning theory, the former postulates external reinforcement of the hierarchy-learning by teacher-intervention, the latter by individualized instruction in the child's own care, from materials arranged for guided discovery by the nonintervening teacher.

Construction

Construction of materials from "the logic of the subject" has been in vogue with curriculum makers since the first lecture was given and the first textbook written, to impart to a new group of learners the winnowings of the past. The Saber-toothed Curriculum has, long since, outlined various philosophies of what should be arranged logically, and the logic to be used. In no case are these logics what we might call "matematical epistemology", or the

growth of knowledge by mathematical logic. This is, no doubt, a result of the environment of teacher education in this country: acres of psychology courses, but not one logic course. As B. O. Smith and Kenneth Henderson found in their famous Critical Thinking study in Evanston-New Trier, most teacher's know nothing of logic.

On the other hand, students instructed using equilibration based upon invariant decalages of readinesses, have been shown to develop a mathematical kind of logic. Materials constructed on the matrix of such decalages (e.g., Walbesser's Science-A Process Approach, or Karplus' Science Curriculum Improvement Study, and in England, Williams' course on moral development) adjust stage-placement to a diagnostically-determined readiness level (usually at the point where at least 80% are ready, to prevent instructional wastage). Using protocols of the student's verbalization during problem solving or critical thinking (i.e., finding which of several answers to one problem is best, which cheapest, which most precise, etc.), one can follow the growth of logical thinking from perceptual seduction in concrete operations to conceptual manipulation of the 16 binary propositions, as in a study of blonde/back hair vs. blue/brown eyes in the classroom, which is pure mathematical logic.

2. Evaluation

Evaluation in the hierarchically-arranged content materials is for mastery of concepts and their relations within larger conceptual schema, according to the Gagne school. Theoretically, a test instrument should be so arranged that in the early items all or almost all of the items are achieved in the exact order of their placement; in the later portions, the test is both time- and power-centered. The results of the evaluation indicate

extent of concept mastery, and decides whether one proceeds, or whether one reteaches and re-tests.

Evaluation in the equilibration model is not concerned primarily with mastery of content, but is diagnostically oriented to the extent along the decalage to which a student has proceeded as he has matured and developed (the latter through peer-group idea-hammering). It is concerned with such processes as serial ordering, class inclusion, reversibility of concepts, multiple classification, exhaustive sorting and classifying, etc. Whereas the factor of student intelligence in learning is held to be constant across the K-12 spectrum in hierarchically arranged material, intellect and logical thinking are held to be growing, dynamic and ever-changing in pursuing one's way along the decalage. Hence evaluation is diagnostic: how far has the student come in seriation, in class formation, etc.? The hierarchy is thought of as never-changing, too--that is, that body of essential knowledge arranged as a conceptual scheme. Equilibrationists, on the other hand, see knowledge as constantly changing (i) both in the real world and (ii) in the intellect, as new facets are uncovered. The whole attitude of the curriculum-builder in equilibration curricula is quite different toward the curriculum.

3. Outcomes

With respect to outcomes, the two models yield quite different results. The hierarchy, is based upon seeing the basic interconnections within and between knowledges, in concept-oriented, and should result in content-oriented, and should result in content-mastery outcomes. The decalage postulates improvement of logical processes, of exclusion of irrelevant and inclusion of relevant data, or knowing how many possible cases one must examine to be sure that all aspects of a given problem have been covered in a scientific, logical consideration. Whereas the constant emphasis of the hierarchy curriculum is

on the "what" of knowledge, that of the equilibration is on the "why" and "how to do" aspects. The new material added to a field of inquiry in the hierarchy-oriented curriculum merely replaces obsolete material, without the student's knowing the "why" of the replacement; in the decalage, the reasons for holding an idea as true at any given moment have been evolved along the same lines as the original thinking, hence the student knows what modifications in theory have been required to match new evidence brought into the input-sorting task.

4. Materials of Instruction

Finally, the materials of instruction are arranged quite differently. Those of the hierarchy approach must rigidly follow the hierarchy of ideas inherent in the logic of the subject, as currently determined. In the decalage of ideas, the rigid portion is the internal growth and development of logical mental structures. Hence, the hierarchy permits in Curriculum a variety of methods of teaching as long as the invariant sequence of ideas is maintained, whereas equilibration allows in Curriculum a variety of both methods and ideas, since the invariant sequence is internal development of logical thinking.

In summary, Gagne's hierarchy and Piaget's decalage yield quite different curriculum material when we contrast them as to (i) construction of learning materials, (ii) evaluation techniques, (iii) outcomes of curricular interaction and (iv) purpose of instructional (curricular) materials. With the firm impact in European education of the equilibration curriculum theorists, and the acceptance, particularly in curricula for the elementary shcools in the United States and Canada, the implication is plain: curriculum development people must reorient thinking to a different invariance than that previously assumed.